Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (Third Year)

Subject: Physics

Paper Code: PYC 106

Paper Title: ANALOG AND DIGITAL ELECTRONICS

Unit: 1 TRANSISTOR MULTIVIBRATORS

Module Name: Monostable Multivibrator

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Transcript

Unit 1 Transistor multivibrators,

Module name Monostable multivibrator

Module #3 Outline Working of monostable multivibrator using transistors.

Learning Outcomes
Understands the basics of monostable multivibrator.
Use of transistors in monostable multivibrator.
Apply monostable multivibrator's in electronics circuits.

The basic multivibrator configuration

consists of two inverting amplifiers, inverting amplifier 1 and inverting amplifier 2.

Inverting amplifier is coupled too inverting amplifier 2

through a coupling network N1

and inverting amplifier 2

is coupled through network N2 to

the input of inverting amplifier one

The nature of coupling networks

between two stages determine

the type of multivibrator.

This is a diagram of

transistor multivibrator.

The output of transistor one is

collector couple to the base

of transistor Q2 through a capacitor

C1 and the output of transistor Q1 (Q2)

Is resistively coupled

through the base of transistor Q1.

This transistor multivibrator acts as

a monostable multivibrator.

This is the diagram of a monostable

multivibrator with the input

output waveforms of Monostable multivibrator,

Monostable multivibrator,

or one shot or monoshot,

or driven multivibrator,

It has only one stable state and one quasi stable state.

It remains in a stable state until an

input pulse triggers it into the other state.

that is a quasi stable state and

after time interval determined by the circuit constants,

the circuit remains …returns to its initial stable condition,

where it remains until the next triggering pulse.

So a small triggering input

generates a large pulse.

The width of which is under the control of circuit designer.

Application of a positive going pulse to the base of transistor Q1 of

sufficient magnitude to make Q1 conduct appropriately lowers

the potential of VC1 to zero this forces the base of transistor

Q2 from zero to near minus VCC,

turning Q2 of immediately after this

instant capacitor C1 begins charging from

minus Vcc towards plus Vcc.

Through resistor R2.

However, as C1 begins to charge towards

plus Vcc, the voltage across C1
is transmitted to the base of T2

And therefore as soon as the base of T2

becomes slightly positive,

T2 turns on again so that the

capacitor C1 does not chance to reach

plus Vcc Volts. When Q2 conducts, its collector voltage

goes to near 0 and the base of Q1 follows the change to a voltage.

below cut off. The trigger pulse are no longer being present.

So the initial stable condition

of T1 off and T2 on is restored,

The various waveforms are shown in Figure 2.

The pulse width Tw is determined
by the time constant R1C1

which controls the delay time

for Q2 in the off condition.

Expression for the width of the pulse.

We consider VB2 voltage at

base of transistor Q2

during discharge and is given by

the relation Vcc minus ic1R1 the

initial discharge current of

ic1 is VCC plus VCC / R1.
ic1 is given by the relation

2 VCC divided by R1 into e raise to minus tau divided by R1C1.

V B2 is equal to VCC minus 2VCC / R1

e raise minus t divided by at R1C1 into R1.

We assume that Q2 switches on when VB2 is 0.

Substituting the value of the VB2 is equal to 0.

We get tau equal to R1C1log2 which is equal to 0.694 R1C1.

Which is equal to the pulse width Tw which is equal to t

By applying a separate voltage to the resistor R1, VBB Base resistor R1

Pulse widtrh Tw is given by relation

R1C1 log one plus VC by the by VBB

by changing the value of voltage VBB
the pulse width can be changed and this gives rise

to a voltage to time converter.

The uses of monostable multivibrator.

It is used as a timer introducing time delay.

Small signal generates large pulse.

Reshaping ragged pulses, Changing the width of

the pulse, stretch short input pulses

narrow wide pulses, blocking multiple

pulses into a single output pulse,
generate gating signals, etc.

The notation used
iC for current

V for voltage, R for resistors,

C for capacitor, T capital T for period, t for time,

f for frequency.

tau for time constant, I slash P for input,
or slash p for output.

I have referred to the following references,

Thank you.